Journal of Orthopedics Research and Rehabilitation

Original Article

DOI: 10.51271/JORR-0048

The effects of Yin yoga on physical, emotional and breathing parameters in healthy adult women: a single blind randomized controlled trial

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Cite this article as: Doymaz F, Azim D, Akgöl AC, Okudan B, Atıcı E, Özkeskin M. The effects of Yin yoga on physical, emotional and breathing parameters in healthy adult women: a single blind randomized controlled trial. *J Orthop Res Rehabil.* 2025;3(2):32-37.

Received: 26.11.2024 ◆ **Accepted**: 14.02.2025 ◆ **Published**: 25.04.2025

ABSTRACT

Aims: Yoga is a comprehensive program that incorporates concentration, relaxation, breathing exercises, and physical postures to synergistically affect the mind and body. This study investigates the effects of Yin yoga on physical, emotional, and respiratory parameters in healthy adult women.

Methods: The study included 24 healthy participants (aged 21.13±0.95 years). The Yin yoga group (n=12) participated in two yoga sessions weekly for six weeks, while the control group (n=12) remained unaltered. Data collection employed the Fatigue Severity Scale, Beck Depression Inventory, Beck Anxiety Scale, skinfold calipers, Timed Up and Go test, sit and reach test, and body-mass index.

Results: The six-week Yin yoga program positively influenced balance, functional mobility, anxiety, depression, and flexibility in healthy individuals, although it did not affect respiratory parameters.

Conclusion: Yin yoga may serve as an alternative method to enhance specific physiological and psychological parameters in healthy individuals. Further research is required to validate these preliminary findings and explore its clinical applications.

Keywords: Yin yoga, balance, fatigue

Key Messages: A six-week Yin yoga program positively impacts balance, functional mobility, anxiety, depression, and flexibility in healthy individuals.

INTRODUCTION

Yoga is an ancient practice developed in India, founded on the philosophy of achieving balance and well-being across physical, mental, and emotional dimensions. The practice includes various postures (asanas) that are maintained over time. Additionally, yoga encompasses voluntary breath control (pranayama), meditation (concentration), and the use of mantra repetitions.[1] Yoga is a comprehensive program that integrates concentration, relaxation, breathing, and physical exercises to influence the mind through proper body positioning.[2] In the Western context, particularly in the United States, yoga primarily emphasizes exercises designed to enhance body flexibility and smoothness. This is achieved by combining asanas with advanced stages of relaxation training.[3,4]

Exercises that involve posture, requiring body control and balance, are designed to enhance flexibility and strength. These poses can be performed in various positions: standing, sitting, lying down, leaning forward, twisting, or maintaining equilibrium. Breathing exercises are typically integrated with asanas and meditation.[5] Brief meditation sessions within the yoga class are conducted in a state of relaxation, typically in a supine position with eyes closed.[6,7]

Yoga promotes physiological deactivation and activates the parasympathetic nervous system.[8] Recent studies indicate an increase in the use of yoga, primarily due to its effectiveness in providing core stabilization through mind-body exercises, enhancing flexibility, and managing pain via relaxation techniques.[9,10]

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Yoga encompasses a variety of styles, with the main types including Laya, Tantric, Mantra, Bhakti, Karma, Raja, Yin, Jnana, and Hatha.[11-13] A distinct feature of Yin yoga is its focus on the connective tissues, achieved through long, passive poses. Typically, these seated or lying poses are maintained motionlessly for 3-5 minutes.[14-16] Additionally, the breathing exercises in Yin yoga, coupled with relaxation techniques performed after completing all asanas-particularly during the shavasana pose-dampen the sympathetic nervous system's activity and activate the parasympathetic system.[17]

Although numerous studies on yoga exist, many fail to specify the style of yoga investigated.[18] Hatha yoga and Iyengar yoga are among the most frequently studied styles.[19,20] However, research on Yin yoga remains limited. The objective of this study is to explore the effects of Yin yoga on physical, emotional, and respiratory parameters in healthy adult women.

METHODS

Our study was conducted with 24 healthy adult female participants at Okan University. We designed a randomized controlled single-blind study, forming two groups. The participants were university students aged 18-24 who volunteered for the study. Individuals with neurological, orthopedic, or metabolic disorders were excluded. All volunteers were informed about the study details and signed informed consent forms, as required by ethical guidelines. The Okan University Non-interventional Clinical Researches Ethics Committee approved the study (Date: 08.11.2017, Decision No: 88-20), confirming compliance with the ethical standards laid out in the Helsinki Declaration of 1975.

We recorded the age, height, and weight of all participants and calculated their body-mass index (BMI). Evaluations were conducted before and after the study period.

Sit and Reach Test

Participants were instructed to sit with legs extended straight, feet against a fixed object, and to reach forward with their hands without bending their knees. The distance between the fingertips and the object was measured (Table 1). Distances before reaching the object were recorded as negative, and those beyond as positive.[21]

Table 1. Yin yoga poses

Pose	Time (minute)
Butterfly	5
Half frog	4
Square	4
Twisted root	4
Sphinx	4
Baby's pose	2
Child's pose	2
Caterpillar	5
Saddle	5
Happy baby pose	2
Shavasana	10

Timely and Walk Test

The participant was instructed to rise from a seated position, walk three meters, turn around, walk back, and then sit down again. The duration taken to complete this sequence was timed in seconds. The Timed Up and Go (TUG) test serves as an objective, reliable, and straightforward criterion for assessing balance and functional mobility.[22]

Skinfold Caliper

When the participant assumed an upright position, measurements were taken from the right side of the body. The procedure involved pinching the subcutaneous fat layer between the thumb and forefinger, ensuring no muscle tissue was included, approximately 1 cm away from the measurement point. The fingers maintained consistent pressure throughout, and the measurement was recorded two seconds after the caliper pressure was applied. Measurements were taken from the triceps, abdominal, thigh, and subscapular regions.[23]

Beck Depression Scale

In Turkiye, the validity and reliability of this scale for measuring the sentimental, cognitive, and motivational symptoms of depression were established by Hisli. The scale ranges from 0 (least severe) to 63 (most severe).

Beck Anxiety Inventory

This self-assessment scale, validated and reliable, assesses the frequency of anxiety symptoms experienced by participants. It is suitable for use with adolescents and adults and can be administered in group settings without time constraints. The scale comprises 21 items, each scored from 0 to 3.

Fatigue Severity Scale (FSS)

The Turkish validity and reliability of this scale, used to assess fatigue, have been confirmed. It consists of 9 items, each scored on a 7-point scale. The overall FSS score is the average of these items. Scores below 4 indicate 'not tired' and scores above 4 indicate 'tired'.[24]

Methodology

Prior to the sessions, participants were randomized into two groups by a blinded second investigator. The Yin yoga group underwent sessions twice a week for six weeks, led by trained physiotherapists specializing in Yin yoga. No interventions were made with the control group. Evaluations were conducted by other researchers at the start and six weeks after the intervention, and a home program was established for the control group.

Statistical Analysis

Data were analyzed using the SPSS 24.0 software. Continuous variables were expressed as mean±standard deviation and median (minimum-maximum values); categorical variables were expressed as number and percentage. The Shapiro-Wilk test was used to analyze data distribution. The Mann-Whitney U test and Wilcoxon paired two sample test were used to compare independent and dependent groups, respectively, based on the suitability of parametric test assumptions. A p-value of less than 0.05 was considered statistically significant for all analyses.

RESULTS

The study encompassed 24 healthy subjects aged 20-23 years. The mean age of the participants was 21.13±0.95 years, the mean height was 165.42±5.47 cm, the mean weight was 57.46±7.33 kg, and the BMI was 21.01±2.51 kg/m^2 (Table 2).

Statistically significant changes were observed in several measures: TUG (p=0.0001), sit and reach (p=0.003), sub-axillary inspiration (p=0.015), abdominal skinfold (p=0.006), and thigh skinfold (p=0.006). Additionally, the Beck Anxiety Scale showed significant changes (p=0.036), as did the Fatigue Severity Scale (p=0.05). When comparing the differences between groups, significant disparities were noted in the sit and reach values (p=0.021), Beck Depression Scale (p=0.001), Beck Anxiety Scale (p=0.01), and Fatigue Severity Scale (p=0.023). Although there was an increase in FEV1 values in the intervention group compared to the control group, these changes did not reach statistical significance (Table 3).

DISCUSSION

While the literature encompasses a variety of related topics, fatigue, depression, anxiety, and balance are extensively interconnected.[25] In the current study, physical and emotional parameters were jointly evaluated before and after a yoga intervention. Assessing balance and mobility in healthy individuals is crucial, as balance is fundamental to daily living activities and significantly influences mobility.[26] Impairments in balance can lead to increased immobilization, difficulty in ambulation, and the potential replacement of muscle tissue with adipose tissue.

To the best of our knowledge, there are several studies on Yin yoga globally. This study aims to enrich the literature

Table 2. Demographic and physical characteristics of study participants*

Variables	Total group (n=24) mean±SD	Yin yoga group (n=12) mean±SD	Control group (n=12) mean±SD	p
Age (year)	21.13±0.95	21±0.95	21.25±0.97	0.53 (t=-0.638)
Weight (kg)	57.46±7.33	55.08±6.08	59.83±7.94	0.114 (t=-1.645)
Height	165.42±5.47	165.67±4.31	165.17±6.62	0.828 (t=0.219)
BMI	21.01±2.51	20.06±2.03	21.95±2.66	0.065 (t=-1.946)

*Demographic variables at baseline for all participants divided into Yin yoga and control groups, SD: Standard deviation, BMI: Body-mass index

Table 3. Pre- and post-intervention measurements and statistical analyses*

	Yin yoga group			Control group			TS intergroup p
Variables	Before, mean±SD	After, mean±SD	Intragroup p	Before, mean±SD	After, mean±SD	Intragroup p	
RightGripForce	21.58±3.92	21.28±4.29	0.704 (t=0.391)	20.93±4.86	19.84±4.46	0.088 (t=1.87)	0.429 (t=0.806)
LeftGripForce	19.38±2.76	17.99±4	0.063 (t=2.072)	18.47±4.54	17.35±4.01	0.05* (z=-1.963)	0.699 (t=0.392)
TUG	7.9±0.69	6.49±0.91	0.0001* (t=10.136)	7.82±1.55	6.43±0.99	0.002* (t=4.095)	0.872 (t=0.163)
SitAndReach	11.13±17.3	30.78±7.18	0.003* (t=-3.785)	18.9±8.87	23.05±8.07	0.084 (z=-1.726)	0.021* (t=2.482)
FVC	2.81±0.8	2.56±0.57	0.084 (z=-1.726)	2.73±0.52	2.66±0.69	0.394 (t=0.887)	0.721 (t=-0.362)
FVC %	73.42±19.93	73.25±13.72	0.208 (z=-1.258)	72.42±14.17	67.75±18.98	0.156 (t=1.521)	0.713 (z=-0.404)
PEF	6.01±2.28	5.65±2.26	0.117 (z=-1.569)	6.24±2	5.43±1.77	0.095 (t=1.827)	0.791 (t=0.269)
PEF %	87.42±32.12	92.08±20.09	0.561 (t=-0.599)	91.08±30.7	84.5±22.35	0.402 (t=0.872)	0.391 (t=0.874)
FEV1	2.56±1.15	3.35±2.03	0.724 (z=-0.353)	2.72±0.52	2.31±1.71	0.343 (t=0.991)	0.189 (t=1.355)
FEV1 %	77.42±34.04	76.92±29.47	0.722 (z=-0.356)	86.5±13.73	61.92±40.18	0.092 (z=-1.687)	0.378 (z=-0.897)
TC.under axilla.Ekspirasyon	83.83±5.01	84.75±6.38	0.582 (z=-0.551)	84.67±6.69	86.04±5.6	0.147 (t=-1.56)	0.604 (t=-0.527)
TC.under axilla İnspirasyon	89.92±4.68	88.92±4.42	0.015* (t=2.872)	90.75±6.2	89.96±5.08	0.959 (z=-0.051)	0.598 (t=-0.536)
TC under.axilla.Normal	86.08±4.83	85.75±5.25	0.663 (t=0.448)	86.33±6.3	86.46±5.29	0.917 (t=-0.106)	0.745 (t=-0.329)
TC.xiphoid.Ekspirasyon	73.17±5.54	75.67±5.26	0.085 (z=-1.89)	74.42±7.09	75.92±6.76	0.06 (t=-2.098)	0.92 (t=-0.101)
TC.xiphoid.İnspirasyon	78.42±4.81	79.58±4.27	0.368 (t=-0.939)	78.5±6.54	79.38±6.14	0.205 (z=-1.266)	0.924 (t=0.096)
TC.xiphoid.Normal	74.42±5	70.67±20.93	0.529 (t=0.651)	75.58±6.56	76.67±6.41	0.129 (t=-1.643)	0.932 (z=-0.087)
TC.Subcostal.Ekspirasyon	69.25±6.3	69.33±5.26	0.935 (t=-0.083)	72.17±7.49	74.25±7.33	0.05* (t=-2.163)	0.072 (t=-1.887)
TC.Subcostal.İnspirasyon	72.17±4.65	72.71±4.65	0.579 (t=-0.571)	74.17±8.17	75.79±6.92	0.11 (t=-1.74)	0.214 (t=-1.28)
TC.Subcostal.Normal	69.83±4.97	70.71±5.22	0.282 (t=-1.131)	73.33±7.82	74.25±7.02	0.258 (z=-1.131)	0.175 (t=-1.402)
Skinfold.Triceps	20.55±6.92	19.83±7.86	0.582 (t=0.567)	22.08±5.81	18.75±5.85	0.102 (z=-1.632)	0.705 (t=0.383)
Skinfold.Abdominal	21.13±7.87	17.5±7.06	0.006* (t=3.394)	23±6.95	16.08±5.52	0.017* (t=2.797)	0.799 (z=-0.262)
Skinfold Femur	34.25±7.12	28.5±10.53	0.006* (z=-2.767)	27.58±4.14	21.75±6.93	0.007* (t=3.272)	0.077 (t=1.855)
Skinfold.Subskapular	16.17±3.93	17.67±4.68	0.653 (z=-0.449)	29.17±54.09	14.25±3.36	0.752 (z=-0.316)	0.068 (z=-1.828)
Beck.Anxiety Scale	9.08±6.93	5±4.07	0.036* (t=2.391)	14.5±10.74	12.25±7.96	0.222 (t=1.295)	0.01* (t=-2.811)
Beck.depression	7.58±4.72	5.75±2.67	0.154 (t=1.529)	14.25±6.76	16.33±4.52	0.175 (t=-1.449)	0* (t=-6.986)
Fatigue Severity Scale	3.72±1.09	2.96±1.12	0.05* (t=2.205)	4.25±1.47	4.05±1.06	0.456 (t=0.773)	0.023* (t=-2.449)

*Comparison of change in primary and secondary outcomes in Yin yoga and control groups, SD: Standard deviation, TUG: Timed Up and Go, PEF: Pulsed electric field, FEV: Forced expiratory volume, TC: Trunk circumference

on the provincial implementation of Yin yoga. Notably, the recent development of the YOMI program, which integrates psychotherapy, awareness practice, and Yin yoga, has garnered attention. Hylander et al.[27] have demonstrated that this 5-week YOMI program significantly reduces stress and anxiety while enhancing mindfulness. Daukantaitė et al.[28] explored the effects of Yin yoga and the YOMI program on plasma adrenomedullin levels and psychological health in stressed adults. They found that adrenomedullin levels, anxiety, and sleep issues were significantly reduced. Furthermore, Yin yoga was shown to decrease both physiological and psychological risk factors associated with non-communicable diseases. It is noted that adrenomedullin levels may be elevated years before the onset of non-communicable diseases (e.g., cardiovascular disease) and could be linked to stress, anxiety, and depression, which are risk factors for these diseases.

Compared to the control group, the yoga group demonstrated greater improvements in balance and functional mobility, aligning with findings from recent studies. For example, Stephens et al.[29] study explored the potential benefits of group yoga for adults with chronic brain injury, building on evidence that one-on-one yoga can improve functional deficits. Nine participants were recruited, with seven completing the study. The research utilized performance measures of balance and mobility, as well as self-reported metrics of balance confidence, pain, and occupational performance. Data were collected at three points: baseline, pre-yoga, and post-yoga, following 8 weeks of bi-weekly yoga sessions led by a trained instructor/occupational therapist. The findings indicated significant improvements post-yoga in balance, mobility, and occupational performance, with no adverse effects leading to withdrawal. de Oliveira et al.[30] observed in their study of patients with multiple sclerosis-particularly those with a lower level of disability-that a post-yoga program significantly enhanced balance and postural stability, positively affecting daily life activities and reducing imbalances. In another study examining patients with multiple sclerosis, yoga therapy yielded statistically significant improvements in fatigue, balance, step length, and walking speed.[31] Additionally, a study aimed at assessing the feasibility of 14-week modified tai chi or yoga programs for frail elderly individuals in residential care found that yoga significantly decreased fall incidence, whereas tai chi notably enhanced quality of life.[32] Furthermore, in research focusing on yoga-based rehabilitation interventions post-stroke, significant enhancements in balance were noted, along with a reduction in the fear of falling.[33]

The strength of this study lies in the detailed assessment of flexibility and fatigue, and the demonstrated positive impact of yoga on these parameters, both within and between groups. Parallel findings from a recent study show that Iyengar yoga effectively increases the flexibility of the erector spinae and hamstring muscles.[34] Additionally, a 10-week yoga program involving university athletes assessed joint angles in three yoga positions (downward dog, right foot lunge, chair) and recorded significant improvements in flexibility and balance due to increased joint angles.[35] Grabara et al.'s[36] research further corroborates these results, indicating that yoga exercises enhance spinal mobility, hamstring strength, and spinal flexibility in women over 50 years of age. Furthermore, studies involving patients with breast cancer and multiple sclerosis support our findings by demonstrating that yoga reduces the intensity of fatigue.[31,37]

In the presented study, significant improvements in depression and anxiety were observed following Yin yoga sessions. A comparative study on the effects of yoga and social support in managing prenatal and postpartum depression showed reductions in depression, anxiety, anger, back and leg pain, as well as decreases in estriol and progesterone levels. Additionally, both groups exhibited reduced cortisol levels after each session.[38] Another study focusing on COPD patients in the coal mining sector reported improvements in physical health, daily living activities, depression, and anxiety as a result of yoga intervention.[39] Similarly, a one-to-one yoga program consisting of 30 asanas applied to children with cystic fibrosis significantly reduced anxiety and joint pain.[40]

It has been observed that Sudarshan Kriya yoga (intensive breath-training yoga) improves anxiety and/or depressive disorders, as well as autonomic control and cardiorespiratory synchronization in patients with these disorders.[41] In the study by Lau et al.,[42] Hatha yoga was found to significantly increase maximum oxygen uptake (VO2max), muscle strength, endurance, and the flexibility of the back and hamstrings. Contrarily, in our study, yoga showed no effect on respiratory parameters. Considering the literature, yoga appears promising for developing and improving respiratory parameters;[43,44] therefore, further research in this area is warranted.

Our study underscores the importance of using skinfold measurements to evaluate physical parameters following yoga training. Notably, prior studies did not utilize skinfold assessments post-yoga for fat measurement. While no significant differences were observed between groups, reductions in abdominal and thigh fat measurements were noted in the intervention group compared to pre-treatment levels. Similarly, Patel et al.[45] reported decreases in body mass index and fat cholesterol levels in young individuals with obesity.

A study involving 40 yoga instructors and 378 students found a negative correlation between depression, anxiety, and stress scores and months of yoga practice; higher awareness and self-compassion scores were associated with shorter durations of yoga practice.[46] Consequently, our yoga training program was designed to last six weeks.

Limitations

Despite the study's significant aims and outcomes, limitations exist in clinical application. The small sample size and the absence of an ideal double-blind methodology restrict the study's implications. Awareness of the yoga intervention among participants in the intervention group could have induced a positive response bias, potentially resulting in a significant Hawthorne effect.

CONCLUSION

This 6-week Yin yoga program demonstrated positive effects on balance, functional mobility, anxiety, depression, and flexibility in healthy individuals. Therefore, Yin yoga may serve as an alternative therapeutic approach due to its multifaceted benefits. Further research is necessary to verify these preliminary findings and enhance their application in clinical settings. Additionally, future studies aim to explore

the effects of Yin yoga on different disease populations and investigate its impact on disease activity.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the Okan University Non-interventional Clinical Researches Ethics Committee (Date: 08.11.2017, Decision No: 88-20).

Informed Consent

All participants signed and free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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